REMARKS/ARGUMENTS

In response to the detailed Office Action dated November 7, 2006, the Applicant offers the following submissions and amendments.

Amendments

Independent claims 1, 19 and 38 have been amended to define the fluid inlet and the nozzle apertures share a common central axis. This feature is disclosed many times throughout the specification and figures (see for example Figure 79 and associated description).

Accordingly the amendments do not add new matter.

Claims – 35USC§103

Claims 1, 19 and 38 *inter alia* stand rejected as obvious in light of US 4,870,433 to Campbell et al. in view of US 5,706,041 to Kubby and US 6,213,587 to Whitman.

Independent claims 1, 19 and 38 have been amended to highlight the fundamental structural differences between the invention and the cited arrangements. The Kubby design is restricted to 'side shooter' type printheads (see col. 3, lines 20 – 24). The ink is ejected parallel to the wafer substrate. The ink channels are etched into the wafer or the cover plate and this limits the printhead to a single line of nozzles per wafer. However, this configuration does allow the trench beneath the heater element to be formed easily prior to attaching the outer cover plate. The bubble generated by the heater has a generally broad, flat shape because of the planar structure of the resistive elements. The pressure pulse created by the bubble has a broad front that initially propagate through the ink to the opposing side of the cover plate before redirecting to eject ink from the nozzle, and also back down the ink inlet path. This is an inherently inefficient ejection of the ink drop and prone to droplet misdirection.

Campbell and Whitman are roof shooters in that the cover plate mounted to the wafer substrate is a nozzle plate that defines the array of ejection apertures. This provides a two dimensional array of nozzles but both Campbell and Whitman feed ink to the heaters along the 'front face' of the supporting wafer. The ink distribution to every nozzle consumes valuable wafer real estate that detracts from the nozzle density (number of nozzles per unit area) which in turn is detrimental to print resolution and or print speed. Furthermore, feeding ink to the heaters from the side, inherently requires the heaters to be unbounded on at least one of its lateral sides. Each heater has a sidewall that laterally bounds the heater (on two side for Campbell and three sides for Whitman). This causes the bubble to be asymmetrical as there is less resistance to its growth toward any unbounded sides. A lack of symmetry in the bubble misdirects the ejected drop and diverts a larger portion the pressure pulse created in the ink back down the inlet path.

The present invention has a lateral boundary enclosing the heater. This is made possible in a roof shooter printhead by aligning the inlet and the nozzle axis. The achieve this, it necessary to feed the chambers with ink from the non-ejection side of the wafer substrate. While, Kubby shows an inlet directed towards the nozzle, the basic operating principles of the roof shooters shown in Campbell and Whitman would need to be changed in order to

incorporate this feature of Kubby's side shooter. None of the citations suggest any way of aligning the inlet with the nozzle aperture while keeping the heater suspended in a plane parallel to the nozzle plate. This combination of elements would require such a fundamental re-design of the basic structures and fabrication techniques used in the citations that the ordinary worker would have no motivation to make such a combination, and no expectation of successfully deriving the claimed printhead.

In light of the above, we submit that the cited references do not render the claimed combination of features obvious. . Likewise, none of the dependent claims are obvious in light of Campbell, Kubby and Whitman.

Conclusion

It is respectfully submitted that the Examiner's objections and rejections have been successfully traversed. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

Applicant/s:

Kia Silverbrook

C/o: Silverbrook Research Pty Ltd
393 Darling Street
Balmain NSW 2041, Australia

Email: kia.silverbrook@silverbrookresearch.com

Telephone: +612 9818 6633

Facsimile: +61 2 9555 7762